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(54) **Heat stable oil-in-water emulsions containing egg yolk and process for its preparation**

(57) The invention concerns a heat stable oil-in-water emulsion containing from 1 to 82 % oil, from 0.1 to 20 % egg yolk, salt and/or sugar, aroma, water, from 0.1 to 5 % diacetyl tartaric acid ester of monoglyceride and having a pH of 3 to 8.

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## Description

The invention concerns a heat stable oil-in-water emulsion and a process for its preparation.

GB Patent No. 1,525,929 concerns a water-in-oil emulsion, with phospholipoprotein containing material (for example egg yolk) modified by phospholipase A (PLA). This emulsion is stable, i.e. when exposed for 30 min. to 100°C. Although this emulsion is effectively heat stable, the great disadvantage is that the egg yolk is enzymatically modified, and secondly the suppression of any residual activity of PLA by proteases is not possible since the proteolytic enzymes would modify the egg yolk proteins and PLA alone can only be inactivated at very high temperature (160°C). Another disadvantage of enzymatically modified egg is that it often has a bitter off taste.

It has now been found that it is possible to prepare a heat stable oil-in-water emulsion by using unmodified egg yolk as emulsifying agent, said emulsion having no residual PLA. The present patent application describes the heat stabilisation of egg yolk by a compound that is neutral in taste and low in price.

The invention concerns a heat stable oil-in-water emulsion containing from 1 to 82 % oil, from 0.1 to 20 % egg yolk, salt and/or sugar, aroma, water and 0.1 to 5 % diacetyl tartaric acid ester of monoglyceride (referred to as DATEM in this specification) and having a pH of 3 to 8.

The DATEM is commercially obtainable either as a powder or as a paste. In case of a powder, a paste is made by dissolving 20 % powder into 80 % water (90°C) and subsequent cooling thereof.

The type of product according to the invention is an edible product like sauces, dressings, desserts and mayonnaise. By oil we mean all food grade oils such as soy bean oil, sunflower oil, grapeseed oil, peanut oil, corn oil, butter oil, butter fat and also cream.

In the case of sauces, the emulsion preferably contains from 5 to 70 % oil, butter and/or cream.

In the case of dressings, the emulsion contains more water and from 5 to 30 % oil.

In the case of mayonnaise, i.e. a product with a high fat content, the product preferably contains from 50 to 82 % oil, from 0.1 to 10 % vinegar and has a pH of 3 to 5.

In the case of desserts, the emulsion contains from 5 to 50 % oil, most preferably around 30 % and from 0.1 to 50 % sugar. Under the wording sauce, any type of sauce is included, for example Sauce Hollandaise, Sauce Carbonara. Under the wording dessert, creme anglaise are more preferably included.

From a general point of view, the obtained emulsion is heat-stable, meaning that it can withstand UHT-treatment (less than one min at 140°C) or sterilization at 110°C for 10 minutes.

The amount of salt and/or sugar used is preferably from 0.1-3 % salt and 0.1-30 % sugar. Aromas and ingredients which lead to savoury or sweet products may also be added.

The egg yolk source is commercially available egg yolk separated from egg white from hen eggs, quails or ostriches stabilised with NaCl (8-10 %) or sucrose (20 %), or egg yolk in the powdered form. The egg yolk content of the emulsion is preferably between 0.1 and 20 %. All the percentages given are by weight. The emulsion contains preferably between 0.5 and 1.5 % DATEM (dry weight) in the sauce and dressings case and between 0.1 and 3 % DATEM (dry weight) in the case of mayonnaise and desserts. A too small amount of DATEM cannot give the required heat stability.

Concerning now the way of preparation, for the mayonnaise, the emulsion is produced without heat-treatment. On the contrary, for a sauce, a dressing or dessert, the production process includes heat-treatment, such as pasteurization, sterilization or UHT treatment. Except for the sauce, the DATEM can be mixed with all the ingredient in the recipe in one step and sterilized. It is also possible to make an homogenisation after the mixing and before the heat-treatment.

The invention concerns further the process for the preparation of a sauce wherein DATEM and egg yolk are mixed together and homogenized at high pressure (comprised between 50 and 150 bar), water, oil, salt and/or sugar, aroma and thickener are added to the obtained mixture which is again homogenized and heat treated.

Heat stability of mayonnaises is tested by heating 10 ml of emulsion in a test tube in a boiling water bath for 30 minutes. Heat-stability of sauces, dressings and desserts is tested by UHT treating (140°C for 10 sec.) or sterilising (110°C for 10 min). After cooling, a 100 ml sample is reheated in a microwave oven (650 watt) at maximum setting for 2 min. Alternatively 500 ml is reheated to boiling point in a glass beaker on a kitchen hot plate. The emulsions are judged visually and emulsions showing oil separation are considered unstable. Structural properties such as roughness and smoothness are determined from the visual appearance of the emulsion. Expert opinion is used.

Examples are now described by way of illustration only.

### Example 1 Sauce Hollandaise

For a 60 kg batch of Hollandaise Sauce, 5 % egg yolk (9.3 % salt) was mixed with 5 % water. DATEM paste was added (5 %), mixed and homogenised at high pressure. Butter, aroma, salt, sugar, thickener and the rest of the water were added, heated to 50°C, emulsified for 3 min at 3000 rev/min in a batch mixer, homogenised once more at high pressure and UHT treated at 140°C for 6 seconds. It was cooled to room temperature and it was heat stable after reheating as described previously.

### Example 2 Sauce Carbonara

For a 4 kg batch of Sauce Carbonara, 2.5 % DATEM paste was mixed with 3 % egg yolk (9.3 % salt), meat pieces, salt, thickener, cream and water in a batch mixer.

It was subsequently sterilised (110°C for 20 minutes). It was cooled to room temperature and it was heat stable after reheating as described previously.

#### Example 3 Creme Anglaise

For a 100 kg batch of Creme Anglaise, 1 % DATEM paste was mixed with 3.75 % egg yolk (20 % sugar) cream, sugar and water and UHT treated (140°C, 20 seconds). After cooling, the product had an acceptable texture and taste.

#### Claims

1. A heat-stable oil-in-water emulsion containing from 1 to 82 % oil, from 0.1 to 20 % egg yolk, salt and/or sugar, aroma and water, characterized in that it further contains 0.1 to 5 % DATEM and has a pH of 3 to 8.
2. A heat-stable oil-in-water emulsion according to claim 1, characterized in that it is mayonnaise and contains further from 0.1 to 10 % vinegar.
3. A process for the preparation of a heat-stable oil-in-water emulsion which is a sauce wherein, DATEM and egg yolk are mixed together and homogenized, oil, thickener salt and/or sugar, aroma and water are added to the obtained mixture which is again homogenized and heat treated.



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# EUROPEAN SEARCH REPORT

Application Number  
EP 94 11 9664

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,A	GB-A-1 525 929 (UNILEVER LIMITED) ---	1-3	A23L1/00 A23D7/00
A	EP-A-0 558 113 (UNILEVER N.V.) * claims 1,7,11 *	1-3	A23L1/24 A23L1/39
A	EP-A-0 251 020 (ASAHI DENKA KOGYO KABUSHIKI KAISHA) ---	1-3	
A	EP-A-0 546 215 (SOCIETE DES PRODUITS NESTLE S.A.) ---	1-3	
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 315 (C-1071) 16 June 1993 & JP-A-05 030 906 (MIYOSHI OIL & FAT CO. LTD.) 9 February 1993 * abstract *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A23D A23L
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
BERLIN		16 May 1995	Caturla Vicente, V
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document</p>			

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